DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS

COMPLETE STATEMENT
OF
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DEPUTY COMMANDER
NORTHWESTERN DIVISION

BEFORE THE

HOUSE COMMITTEE ON RESOURCES

ON

HYDROPOWER, RIVER MANAGEMENT AND SALMON RECOVERY ISSUES ON THE COLUMBIA/SNAKE RIVERS

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PASCO, WASHINGTON

INTRODUCTION

Mr. Chairman and members of the Committee, I am Colonel Eric Mogren, Deputy Commander, Northwestern Division, U.S. Army Corps of Engineers. Thank you for this opportunity to discuss the actions of the Corps affecting hydropower operations, river management and salmon recovery issues on the Columbia River system.

BACKGROUND

The Corps constructed and operates twelve major dams in the Columbia River Basin that affect the habitat and migration of anadromous salmon and steelhead and other aquatic species listed under the Endangered Species Act. The dams are authorized under project authorities in the Rivers and Harbors Acts of 1935, 1945, 1946, 1950, and 1962 for multiple uses including flood control, power production, navigation, recreation, fish and wildlife, irrigation and municipal and industrial water supply.

Bonneville, The Dalles, John Day and McNary dams on the lower Columbia River and Ice Harbor, Lower Monumental, Little Goose and Lower Granite dams on the lower Snake River are in the migratory path of several species of salmon and steelhead. Two upstream storage dams operated by the Corps — Dworshak in Idaho and Libby in Montana — contribute to salmon restoration actions through flow augmentation. The remaining two are Chief Joseph and Albeni Falls dams.

The Corps Northwestern Division office in Portland and the Walla Walla, Portland, and Seattle District offices are involved in efforts to improve salmon migration through the Columbia and Snake River corridor.

ENDANGERED SPECIES ACT / BIOLOGICAL OPINIONS

Many Columbia River Basin stocks of salmon and steelhead are in decline. In 1991, the National Marine Fisheries Service (NMFS) listed the Snake River sockeye salmon as endangered under the Endangered Species Act (ESA). In 1992, the Snake River spring/summer and fall chinook salmon were listed as threatened. Over the last several years, other Columbia and Snake River salmon and steelhead stocks have been listed under the ESA. Currently, there are 12 listed salmon and steelhead stocks within the basin. The U.S. Fish and Wildlife Service (USFWS) has also listed two species of resident fish in the basin: bull trout and Kootenai River white sturgeon.

No single factor is solely responsible for the decline of the salmon, and it will require efforts across all life cycle influences to restore listed stocks. Recovery efforts must address four life cycle areas, referred to as the All-H's — harvest, habitat, hatcheries, and the hydropower system. The Corps' primary role in recovery efforts is to implement measures at its dams and reservoirs to assist recovery of salmon and steelhead and other listed fish populations.

The salmon, steelhead, bull trout and sturgeon ESA listings triggered the requirement for Federal agencies to consult with NMFS and USFWS on hydro-system operations and configuration affecting the listed species. Formal consultation begins with a Biological Assessment from the "action" agencies, i.e. the Corps, Bonneville Power Administration (BPA) and the Bureau of Reclamation (BoR), and culminates in hydropower Biological Opinions from the ESA regulatory agencies. The action agencies are currently operating under 1995 Biological Opinions from NMFS and USFWS and 1998 and 2000 Supplemental Biological Opinions to address additional salmon and steelhead species listed since 1995. The Opinions contain measures to avoid jeopardizing the continued existence of listed salmon, steelhead, bull trout and white sturgeon species.

Because the Biological Opinions were written as interim documents pending results of long-term studies, the action agencies transmitted a new Biological Assessment to NMFS and USFWS in December 1999. It addresses proposed operation and a decision process for long-term configuration, of the Federal Columbia River Power System.

The 1999 Biological Assessment incorporates measures that were put into place under the 1995 NMFS and USFWS Biological Opinions, a 1998 supplemental, a 1999 Biological Assessment on listed bull trout and sturgeon, and a 1999 draft Biological Opinion pertaining to listed Columbia River chum salmon. The Biological Assessment identifies both near and long-term actions intended to improve fish passage. Near-term actions include:

- Flow augmentation – Release of water from storage or headwater reservoirs to meet flow targets in the lower river for salmon and steelhead.
- Reservoir operations – Operations of headwater projects to provide for spawning and recruitment of Kootenai River white sturgeon, and minimize rapid fluctuation in both reservoirs and unimpounded river reaches for improved bull trout habitat conditions; and release of water from Dworshak Dam for temperature control.

- Spill measures – Water passed at a dam through a spillway rather than being sent through the turbines to guide fish away from the turbines, thereby reducing the percentage of turbine-related mortality.
- Fish transportation – Juvenile salmon and steelhead collected at dam sites on the Snake and Columbia rivers and placed in specially designed barges to be transported down river and released below Bonneville Dam.
- Predator control programs – Programs intended to help protect juvenile salmon from other species that prey on them, such as northern pikeminnow and Caspian terns.

Long-term actions in the Biological Assessment include:

- Lower Snake River survival improvement study – A feasibility level study to analyze alternatives for long-term configuration and operation of the lower Snake River dams, including breaching..
- Water quality – Studies intended to improve dissolved gas and temperature conditions.
- Passage improvements – Turbine studies to identify operational and structural modifications to make turbine passage less harmful to fish; testing of surface collectors; bypass improvements; and additional fish transport facilities.

We are currently consulting with NMFS and USFWS and expect new Biological Opinions in summer 2000.

The consultations are addressing several operational and configuration actions, including four main issues: breach of four Snake River projects, increased spill, study of potential flood control modifications and addressing water quality. We anticipate that the Biological Opinions will address long-term operations and configuration needed to ensure survival of the listed stocks throughout the Columbia River Basin. Further, we anticipate that a series of performance measures and standards will be fully developed so we can judge the success and end-point of our efforts. The Biological Opinions cover the hydropower projects in the Federal Columbia River Power System and all listed species, and they will be pivotal factors in the Corps long-term decisions for the four lower Snake River dams.

IMPROVEMENTS IN DAM PASSAGE

The NMFS 1995, 1998 and 2000 Biological Opinions identified many near-term actions for the Corps to protect salmon and steelhead, and a long-term plan to investigate and evaluate new ways to operate and configure the dams. In accordance with the Biological Opinions, near-term actions have included increased flow augmentation and spill for juvenile fish; juvenile fish transportation has continued in the mix of measures; adult and juvenile fish passage systems have been improved; powerhouse operations have been adjusted; spillway flow deflectors have been added to more dams to increase fish passage through spill without a resulting increase in gas supersaturation; and research and monitoring facilities have been added.

These actions have been successful in improving juvenile fish survival at the dams. Recent NMFS research on spring/summer chinook indicates that between 50 and 60 percent of juvenile fish that migrate in-river successfully pass the Corps dams on the lower Snake and Columbia Rivers, up from about 10 to 40 percent in the 1960s and 1970s. About 50 to 60 percent of migrating juvenile fish are collected and transported past the dams in barges or trucks. Approximately 98 percent of the transported fish survive to the release point below Bonneville Dam. Therefore, the combined survival of transported juvenile fish and in-river migrants through the migratory corridor of Corps dams is about 70 to 80 percent.

One of the scientific uncertainties that exists is indirect mortality that may occur after juvenile salmon have left the hydropower system or been released from the barges or trucks. This indirect mortality may be a result of passage through the hydropower system, transportation, or other factors. Research is underway to address this uncertainty and obtain better information.

LOWER SNAKE RIVER STUDY

In response to the requirement in the Biological Opinions to evaluate long-term alternatives for the four lower Snake River dams, the Corps initiated the Lower Snake River Juvenile Salmon Migration Feasibility Study. The primary objective of this study is to develop a plan to improve migration conditions for salmon and steelhead in the lower Snake River and to contribute to the recovery of these stocks. This study addresses the four lower Snake River dams — Ice Harbor, Lower Monumental, Little Goose, and Lower Granite. It does not address specific actions on dams and reservoirs on the Columbia River, or other factors in salmon decline besides operation of these projects.

The geographical scope is the lower Snake River, from its confluence with the Columbia River extending upstream approximately 140 miles to the city of Lewiston, Idaho.

The study examines the following four major alternatives for the four lower Snake River dams:

1) maintain the existing fish passage system with current and planned improvements;
2) maximize transportation of juvenile fish;
3) make major system improvements such as surface bypass, gas abatement measures, and turbine passage improvements; and
4) implement permanent natural river drawdown by breaching the dams.

In December 1999, the Corps released a draft Environmental Impact Statement (EIS) on these alternatives for public review. In order to allow all affected parties in the region to address the issues within the broader context of other ongoing regional efforts for Columbia River Basin fish, a preferred alternative was not identified in the draft EIS. In conjunction with the Federal Caucus (nine regional agencies) the Corps held 15 public meetings in February and March 2000 throughout the region (OR, ID, WA, MT, AK). The purposes of the public meetings were to share information and take comment on the draft EIS and the Caucus' All-H Paper: *Conservation of Columbia Basin Fish*. The comment period on the draft Lower Snake EIS was extended by one month, to April 30, 2000.

A final EIS is expected to be published in late 2000. If the recommendations in the final EIS include dam breaching, Congressional authorization and appropriations would be necessary. The other alternatives being considered would require appropriation of funds by Congress, but not specific authorization for implementation.

JOHN DAY DRAWDOWN STUDY

The NMFS 1995 Biological Opinion and 1998 supplement called for study of drawdown of the John Day Dam on the lower Columbia River. The Corps recently published its draft John Day Dam Drawdown Phase I Study report. The draft report looks at biological and economic effects of the following four alternatives: natural river level drawdown with and without flood control, and spillway crest level drawdown with and without flood control.

Based on the economic cost and biological benefit expected under any of the alternatives, the Corps' preliminary recommendation is that no further study of John Day Dam drawdown is warranted. The review and comment period extends to May 1, 2000. The Phase I final report to Congress later this year will incorporate any additional information gathered during the comment period.

TURBINE PASSAGE IMPROVEMENTS

The Corps has been involved in a comprehensive program to investigate improving fish passage through turbines since the early 1990s. The investigation consists of both biological and engineering studies. The NMFS 1998 Supplemental Biological Opinion also included a measure to evaluate the new minimum gap runner (MGR) design at Bonneville Powerhouse I.

From November 1999 to January 2000, tests were conducted at Bonneville Powerhouse I to compare results in unit 5, a conventional unit, and unit 6, the MGR unit. Our initial analyses of the test results verify that the MGR turbine is safer for fish. Injury rates were low for both the conventional and MGR units, but the MGR had about half the injury rate of the conventional turbine, plus a better survival rate. Survival rates for fish released at the turbine hub from both the MGR and the conventional turbine was 97 to 100 percent; for mid-blade releases from 95 to 97 percent. Survival rates for fish released from the blade tip of the MGR were about 94 to 97.5 percent compared with survival rates of about 91 to 95.5 percent with the conventional turbine. An added benefit of the MGR turbine appears to be improved operating unit efficiency. This improved efficiency could partially compensate for lost generation due to spill.

The study results are still undergoing detailed statistical analyses and, therefore, initial observations should be considered preliminary and subject to further interpretation. It should also be noted that this study evaluated direct mortality and injury caused by passage through the turbine units and did not evaluate delayed effects in the tailrace (below the dam).

As a result of these encouraging results, we made the decision to incorporate MGR turbines in the remaining rehabilitation of the Bonneville Powerhouse I operating units and to evaluate their use in the other projects of the Columbia River Federal Power System.

HABITAT IMPROVEMENTS / CASPIAN TERNS

Survival improvement in the Columbia River estuary is of particular interest to the Corps. Once the juvenile fish safely pass the hydropower dams, it seems prudent to take steps to see them safely through the estuary. In 1998, Caspian terns nesting on estuarine islands consumed about 11 million of the approximately 95 million juvenile salmon that survived to the estuary. Modifications in the flow regime and in tidal wetlands have further eroded the health of the estuarine ecosystem. We are currently working with Federal, State and local interests to lay out the comprehensive studies, planning and actions needed to improve fish survival through the estuary.

A September 1999 Biological Opinion from NMFS on channel maintenance actions in the Columbia River, called for the Corps to take all necessary actions to prevent Caspian tern nesting on Rice Island in 2000. At this time a preliminary injunction has halted Corps actions on Rice Island, although the Corps has appealed and is seeking emergency relief pending a ruling on the appeal. The Corps continues to work with the Caspian Tern Working Group on a USFWS long-term plan for relocating the birds.

FUNDING: COLUMBIA RIVER FISH MITIGATION AND O&M

Construction activities for fish facilities at the eight lower Columbia and Snake river dams include continuing improvements to juvenile and adult passage facilities, evaluations and studies. These activities are funded with Congressional appropriations through the Columbia River Fish Mitigation Project (CRFM). The estimated total project cost from its start in 1988 to its projected finish in 2007 is $1.4 billion. The FY01 budget request for CRFM is $91 million. BPA repays the U.S. Treasury for the power share (about 80%) of capital costs of fish facilities construction at the Corps projects. The Attachment to this statement provides budget information on CRFM for FY00 and preliminary estimates for FY01.

The Corps Operations and Maintenance program for fish facilities includes operation and maintenance of fish facilities and hatcheries, operation of the Juvenile Fish Transportation Program, and some fish research activities. O&M is funded through Congressional appropriations and by direct funding agreement with BPA (80 percent BPA funding). These costs are about $29 million per year.

FEDERAL CAUCUS AND ALL-H PAPER

Corps activities for fish in the hydropower system and other potential actions to improve salmon survival must be considered in the broader context of the entire Columbia River Basin, for multiple species, and across the salmon life-cycle influences: habitat, harvest, hatcheries and hydropower. To provide this broader context a Federal Caucus was formed to develop a comprehensive strategy for recovery of Columbia River Basin fish. The Federal Caucus includes representatives from NMFS, USFWS, BoR, Bureau of Indian Affairs, Bureau of Land Management, EPA, the Corps, U.S. Forest Service, and BPA.

The Caucus has prepared a draft "All-H Paper" to lay out options for actions in the areas of hydropower, harvest, hatchery management, and habitat improvements to be integrated into a comprehensive strategy for recovery of the listed species. The results of the Corps' Lower Snake River study are integrated into this effort.

The All-H Paper provides a framework for recovery actions. It is a unified Federal approach to look at all aspects of the life cycle in a comprehensive manner. This has created a context and a common operating concept for us to work with the States and Tribes, to coordinate and collaborate on technical and policy decisions for Columbia Basin fish recovery. The Federal agencies have begun a joint consultation with the thirteen Columbia River tribes framed around the All-H Paper as a basis for constructive discussion.

PUBLIC MEETINGS

The Federal Caucus and the Corps of Engineers have recently completed a series of 15 public meetings throughout the Pacific Northwest and Alaska. We presented the results of the Lower Snake River EIS and Phase I John Day Dam Drawdown Study in conjunction with the Federal Caucus Draft 4-H paper to demonstrate that the various aspects of salmon recovery cannot be discussed in isolation. At each meeting we stressed that the purpose of the process was primarily to enhance public understanding of the issue and our range of alternatives and to solicit input on the quality of our analysis. The purpose was to share information from the Federal Caucus "All-H Paper", the Corps' Lower Snake River draft report and EIS, and Phase I John Day Dam Drawdown study; and also to get input from the public.

At the public meetings, we heard from many people in the region — an estimated 9,000 people attended, of which approximately 1,500 provided oral comments either in the meeting sessions or via tape recorders. We have also received tens of thousands written comments.

In spite of our best efforts to include the broader context of salmon recovery, the comments focused on the dam breaching issue. I heard many deeply held and sincere views on both sides of this issue. The meetings were not intended to be a referendum. There seemed to be a broad perception in the region that public comment at the meetings would be taken as a vote on the dam breach issue; it was not.

We listened carefully to what people had to say at these public meetings. What we heard at the meetings was just one part of the input we have received in our overall public involvement process. We have received many comments covering all sides of the issues. We will consider every comment received, and resolve the issues raised in the comments in our final EIS.

I want to stress that the Corps will base its recommendation principally on the science provided by the NMFS and USFWS and the economic impacts as assessed by the Drawdown Regional Economics Working Group. We will also include consideration of a wide range of factors such as cultural issues, social impacts, treaty obligations, and compliance with the relevant laws.

With the listing of 12 species of salmon and steelhead in the basin, it has become increasingly clear that the region needs to shift its focus to the broader perspective. Only four of the twelve listed species are in the Snake River. We need to examine what we can do across the life-cycle influences — habitat, harvest, hatcheries, as well as hydropower — to make the best use of limited resources for the best outcome for fish, wildlife, and people.

NEXT STEPS

The Federal Caucus draft All-H Paper is a good step in creating a framework for recovery actions. It will be a dynamic process. The Federal Caucus team is now sorting through the public comments on the draft All-H Paper and will be producing a final document in tandem with the NMFS and USFWS Biological Opinions.

In May we expect the revised All-H Paper and draft Biological Opinions. The Corps will consider these documents in choosing a preferred alternative in the Lower Snake River EIS. We expect final Biological Opinions in summer 2000. The measures called for in the Biological Opinions will be a critical factor in the Corps' choice of a preferred alternative in the final EIS.

ACTIONS / STUDIES

Mr. Chairman, you have asked that the Corps address actions that can be taken to protect salmon stocks in the next 5-7 years; to describe the results of studies carried out or funded by the Corps; and discuss the current status of barging of juvenile salmon and how recent information relates to that presented in the PATH study.

Near Term Actions

Actions proposed to protect salmon stocks in the coming years at the Corps dams and reservoirs are detailed above in the description of the action agencies' 1999 Biological Assessment for the Federal hydropower system. These include continued flow augmentation, spill for fish, and operation of the juvenile

fish transportation program. Changes in the fish facility and dam structures will also improve salmon survival, such as:

- replacing standard-length guidance screens in the juvenile fish bypass systems with the extended-length screens at Lower Granite, Little Goose, McNary and John Day dams
- additional moorage facilities at Lower Granite Dam for the juvenile fish transportation program
- juvenile collection channel improvements at McNary Dam
- improvements to adult fish passage
- additional flow deflectors at Ice Harbor and John Day dams

We also plan to continue studies of gas supersaturation improvements, turbine passage improvements, and surface bypass options for juvenile fish passage.

Other activities the Corps could take in the near term include habitat improvements, such as moving Caspian terns out of the Columbia River estuary to decrease predation on salmon and steelhead smolts, and improving tidal wetland conditions.

Corps-funded studies

The Corps has sponsored biological studies continuously since 1952 in an integrated, applied research program to better understand and improve anadromous fish passage conditions at its multi-purpose projects on the Columbia and lower Snake Rivers. These monitoring, research, and evaluation studies are managed under the Anadromous Fish Evaluation Program (AFEP). The AFEP is coordinated with Federal, state, and tribal fish agencies who provide both technical and policy level input to the Corps on study objectives, experimental design, and methodologies. A few AFEP studies are funded from project operations and maintenance accounts. Most studies are integral components of elements of the Columbia River Fish Mitigation project.

These studies evaluate passage success, survival, and fish condition for surface bypass technologies, juvenile fish transportation, conventional juvenile fish bypass systems, spill, total dissolved gas, drawdown, adult migration/passage, in-river passage, and turbine passage. Historically, studies have focused on project-specific adult and juvenile fish passage issues. Most of the passage facilities and operations on the river have been developed and refined based on results of these studies. The increased survival rate through the system described in the section above on "Improvements in Dam Passage," attests to the success of these improvements as well as operational changes.

AFEP funded over 40 studies costing about $13 million in 1999, including research contracts, project services and administrative support.

Juvenile Fish Transportation

The juvenile fish bypass systems in the dams guide fish away from turbines by means of submerged screens positioned in front of the turbines. The fish are directed up into a gatewell and pass through orifices into channels that run the length of the dam. The fish are then routed either back out to the river below the dam, or to a holding area for loading onto specially equipped barges or trucks. Four Corps dams are equipped to collect and transport fish: Lower Granite, Little Goose, Lower Monumental, and McNary. All transported fish are released downstream of Bonneville Dam. The operation is funded and staffed by the Corps.

Since 1968, The Corps has funded research to find the best methods of transporting juvenile salmon and to assess related survival levels. It has been determined that transported fish do not stray any more than

non-transported fish, that barging is somewhat more effective than trucking and, most importantly, that transport returns significantly more fish than non-transport as measured by smolt to adult return rates (SAR's). The major issues is whether barge transportation can achieve the SAR needed to halt the population decline and move to recovery. An important question that we are seeking to answer is the level of delayed mortality for transported and non-transported fish. This is a significant factor in determining the overall benefit of transport.

The Corps operates the juvenile fish transport program under a spread-the-risk operation, as prescribed in the NMFS 1995 Biological Opinion and 1998 and 2000 supplements. This operation allows the collection and transport of approximately 50 percent of the Snake River smolts. The remaining 50 percent are left to migrate in-river. This strategy was adopted because of potential uncertainties associated with the transport program. There is much we do not know about salmon and steelhead behavior and what affects their survival. It is not fully understood why these stocks continue to decline.

The analysis conducted by the Plan for Analyzing and Testing Hypotheses (PATH) group of scientists has not had an effect on how we currently operate the hydropower system. The Corps is not relying solely on the PATH results to make decisions on future operations. We are also examining the Cumulative Risk Initiative (CRI) analysis results and past research information on the transportation program, which was conducted by NMFS. The PATH analysis helped raise and focus in on some key uncertainties within the hydropower system, such as: potential differential delayed transport mortality (the “D” value) and other potential extra mortality.

NMFS has conducted many years of research on the transportation program. The majority of this research shows effectiveness of barging smolts. As pointed out in their recent White Paper on this subject, there are also some critical uncertainties, such as: potential delayed mortality, need for better control groups (which NMFS is addressing), and high variability in the research results within and between years. The Corps believes that an aggressive research program with continued transportation is the only viable way to resolve or reduce some of these key transportation uncertainties.

Mr. Chairman, this concludes my testimony. I would be happy to answer any questions.

ATTACHMENT

Columbia River Fish Mitigation Project
System Configuration Team (SCT) Measures Worksheet
Preliminary FY01 Estimates

Activity Type [1]	Activity/Description	FY00 Estimate (000's)	FY01 Estimate (000's)
	LOWER GRANITE		
I	Extended length screens	695	700
I	Juvenile bypass facility	0	75
S	Surface bypass program - Final test of the Lower Granite SBC and BGS in 00.	7,900	13,000
I	Additional barge moorage	175	1,763
I	Auxiliary water supply	195	300
S	Gas fast track	80	675
I	Implement ESBS report actions	25	80
	LITTLE GOOSE		
I	Extended length screens	1,370	620
I	Trash shear boom	2,500	100
I	Auxiliary water supply	195	300
I	Adult PIT detectors - Placeholder. Initiate design.	0	
S	Gas fast track	400	1,600
I	Implement ESBS Report Actions	25	80
I	Juv. fac. PIT tag improve	200	285
	LOWER MONUMENTAL		
I	Auxiliary water supply	765	5,000
I	Adult PIT detectors - Placeholder. Initiate design.	0	
S	Gas fast track	1,250	665
I	Outfall relocation	75	137
	ICE HARBOR		
I/S	Flow deflectors	720	720
I	Auxiliary water supply	715	4,426
	Adult fallback/ juv. Collection channel - Further action on hold pending evaluation at McNary		0
S	AFEP (Anadromous Fish Evaluation Program)	60	
	Replace dewatering screen panels	125	
	McNARY		
I	Extended length screens	960	4,200
	McNary ESBS Miscellaneous Improvements.		205
S	Orifice shelters.	0	
S	Cylindrical dewatering.	1,680	375
I	Juvenile collection channel improvements .	350	560
I	Fish ladder exit mods.	250	370
I	Forebay debris control	380	
I	Adult fallback/ juv. Collection channel	125	100
I	Adult PIT detectors	0	
S	Gas fast track	1,885	430

Activity Type [1]	Activity/Description	FY00 Estimate (000's)	FY01 Estimate (000's)
	McNARY (continued)		
I	Juvenile facility improvements	300	500
I	Juv. Fac. PIT tag improvements	150	
I	Adult collection channel stoplogs	446	1,873
S	Lamprey eval (AFEP)* - Evaluate effects of ESBS's on Lamprey	50	500
I	Trash shear boom design/const*	345	80
	JOHN DAY		
I	Monitoring facility	440	
S	Flow deflectors (navigation impacts).	300	TBD
S	PH surface bypass		
S	Spillway surface bypass	460	1,000
S	Biological studies	2,500	2,500
S	Drawdown study	560	TBD
S	John Day mitigation relocation evaluation (Ringold)	150	150
I	Extended length screens	2,000	3,000
S	John Day ladder jumping and holding (L Col. adult passage improvement)	250	350
	Gas fast track	100	TBD
	THE DALLES		
I	Sluiceway outfall/ emergency AWS	1,500	3,000
I	Adult channel dewatering	620	2,500
S	Spillway and sluiceway survival study.	2,000	2,300
S	Surface bypass	2,170	3,600
I	Juvenile bypass system	0	0
S	Gas fast track		430
	BONNEVILLE		
I	PH2 DSM, monitoring and outfall relocation	2,800	1,725
I	PH1 DSM, monitoring and outfall relocation	2,650	8,300
S	PH2 gatewell debris cleaning	100	610
S	Surface bypass	10,130	2,500
S	PH1 FGE - FGE retests defered until FY00.	1,700	1,000
S	Flat plate PIT tag detector	50	50
S	PH 2 FGE	2,600	4,000
S	Adult fallback	400	1,000
S	PH 2 fish units intake debris (L Col. adult passage improvement)	300	300
S	PH 2 AWS (L Col. adult passage improvement)	250	500
I	B1 FV1-1 automated screen cleaning (L Col. adult passage improvement)	150	
S	Spillway efficiency/survival studies	500	500
S	Gas fast track	460	510
I	Implement gas fast track		150
	SYSTEM		
S	Gas abatement study	950	192
	Lower Snake River Juvenile Fish Facility Improvements	200	320
S	Gas fast track- physical injury studies -	0	100
S	Turbine passage survival	2,955	1,660
S	Adult passage improvements L. Col - FY00/01: See specific measures under John Day, Bonneville and System studies.		
S	Lower Snake River feasibility study	3,000	1,000

Activity Type [1]	Activity/Description	FY00 Estimate (000's)	FY01 Estimate (000's)
	SYSTEM (continued)		
S	Aux. water supply in fishladders/Snake River projects	55	
S	Fish ladder temperature control evaluations	0	
S	Separator evaluation	850	1,400
S	Dispersed release (short haul barging)	0	0
S	McNary/Ice Harbor fallback evaluation	0	
S	Multiple bypass evaluation (AFEP)	80	460
S	Estuary PIT recovery (AFEP)	920	1,000
S	Adult PIT	400	480
S	Lamprey passage studies (L Col. adult passage improvement)	350	350
I	Automated trash rakes at 3 locations (L Col. adult passage improvement)	15	750
S	Lower Columbia feasibility study - Placeholders to initiate/continue study in FY00 or 01, including initial McNary drawdown and John Day drawdown phase II studies	50	5,000
S	Fish ladder transition pool eval	500	250
S	Adult passage AFEP	3,000	3,000
S	Delayed mortality eval	1,440	930
I	Snake River Drawdown PED		
	TOTALS [2]	74,296	96,586

[1] S = Study I = Implementation

[2] The totals reflect regional priorities and Corps capabilities. They differ from FY00 totals as enacted and FY01 budget request totals due to carryover and savings and slippage.